

$$E = \text{Islam}^2$$

Here we go again!

Today, we will try to use science to help us make sense of Islam, ie. to square off the idea that our religion is not a hoax. More specifically, we will attempt to show that there is a legitimate scientific basis for the miracles that Allah ﷻ describes in our favourite book, the Holy Quran, and, therefore, that there is no scientific reason to doubt anything that it says, including the miracles that it describes.

To start with, you have likely already heard of Albert Einstein's famous equation, $E=mc^2$, and also about how it continues to help us better understand our universe, especially where ideas like space-time and gravity are concerned. However, you may not know the "other side" of this equation, the one that another scientist, Max Planck, came up with, namely:

$$E=hf$$

If you're not familiar with physics, this may seem like a new equation or concept, but it is not. It has been around since 1900!

To keep our discussion short, we can summarize the importance of these two mens' contributions in helping us better understand our universe, by saying that Einstein's equation links the total energy, E , contained in something to its mass, m , multiplied by the speed of light squared, c^2 , whereas Planck's equation links that (same) total energy, E , to the result of the frequency, f , of something, multiplied by (what is called) the Planck constant, h .

What Einstein's equation says can be illustrated by looking at what the military did, back in Einstein's time, once they got a hold of his idea: they made a nuclear bomb. So, if we consider the mushroom clouds created by the nukes at Hiroshima and Nagasaki, including the loud booms, radiation, and devastation they caused, it will add up to the total energy, E , that was released, as can be predicted by Einstein's equation, $E=mc^2$.

For Planck's equation, $E=hf$, the h in the equation, known as Planck's constant, in some interpretations of it, basically dictates what the smallest possible physical length, volume, and amount of time can be in our universe. Such interpretations say that, therefore, our physical universe is "pixelated," such that, ultimately, if we zoom in far enough into it, all physical objects in our universe have (ultra fine) "jagged edges" to them, much like if you were to zoom into a picture on your computer, going in as close as possible as your photo editor app will allow you. However, all interpretations agree that this h is what allows us to understand that eg. visible light/colour is actually different types of tiny packets, all vibrating at different discrete frequencies, f , with set levels/amounts of energy, as predicted by Planck's equation, $E=hf$.

Well, what does this all mean, anyway?

So, essentially, it means that, where one guy, Einstein, says energy is related to mass (eg. as manifested in a physical particle), the other guy, Planck, says energy is related to (quantized) frequency; Experimentation has proven both ideas correct to the point that, when speaking about energy, it is observable by way of either:

- Particles that behave like waves, or
- Waves that behave like particles

This is because, whether it is the wave aspect we focus on, or the particle aspect instead, our scientists say it doesn't matter which statement is said because the results from experiments end up being described equally well, regardless of how we try to make sense of things when talking about energy.

One important point to note is that Einstein's equation works well, but only as long as you look at energy on the atomic level or higher (ie. molecules, gasses, solids, liquids, etc.). But, for Planck's equation, it goes the other way, and works really well, but only as long as you look at energy on a subatomic level (ie. quarks, muons, w-particles, etc.; "quantized energy").

And, yes, scientists are trying to figure out a way to come up with what is called a Grand Unification Theory, which will get past the limitations of both of these equations, and provide a way to explain all observations, regardless of having to look at an atomic or subatomic level, but that discussion is besides the point we are trying to make, and way out of the scope of our discussion.

So, for what we are discussing, the point is that energy can be described in two different ways, in Einstein's way, or in Planck's way, but this means we can combine their two equations to get the following result:

Since $E=mc^2$, and since $E=hf$, we can then say: $mc^2=hf$

Now that is a profound statement because it says that, when talking about energy, all things that have a mass, m , also vibrate at a (natural) frequency, f , especially on what's called the "quantum level," ie. the level of the universe's "pixilation" that we mentioned earlier.

This idea is called the wave-particle duality, and it is a huge underlying concept, especially for us living now in the 21st century, and especially in terms of the new direction in which our scientific and technological developments are taking us.

And what direction is that?

It's in the direction of: Quantum Mechanics (QM), or, in casual terms, as some would suggest, in us going about thinking of everything existing in our physical realm as being pixilated on an ultra fine level (ie. as defined by h , aka Planck's constant).

For scientists, QM is not as new a field of study, as it may (possibly) seem to the rest of us who are "on the outside," especially because so much has already happened in the field of QM from 1960 until 2012, the period in which another scientist, Peter Higgs, had his theory about a particle, now known as the Higgs boson, proven true, ie. that it exists, and that it is the most fundamental particle that we know (so far).

Over all the many years that have passed, QM's growth and development has influenced the many new ways we have of thinking about the absolute reality of our world; about the absolute truth that forms the physical basis of us, mankind, and everything else that is around us, our environment.

This is because, Peter Higgs's work, and the ideas hidden deeper within Einstein's and Planck's equations, once they were realized, lead us to think, as we do now, that the actual basis of everything physical, including ourselves, is the result of an interaction of multiple different "fields of energy."

So cellphones, tv's, goldfish, coffee mugs, etc., ie. any physical object that you see, including yourself, your hands, your feet, your hair, your toes and toenails, etc., even though they are all real and physical objects, are now all thought to be the result of a whole bunch of different fields becoming grouped together, and turning into the shapes that we can recognize, as eg. you, me, the moon, water molecules, atoms, etc.

So, from the QM perspective, it is the interaction of those various fields, which forms the basis of the physical reality that we experience.

And, each field, according to our current understanding, vibrates in a different way such that particles we call electrons vibrate in the electron field, while particles we call quarks vibrate in the quark field, and so on. Please note that, when we say vibrate, what we really mean is that these fields have a frequency. And please recall that we mentioned there is a connection between frequency and energy. And please also recall that we mentioned there is also a connection between mass and frequency. We said:

Since $E=mc^2$, and since $E=hf$, we can then say: $mc^2=hf$, and we also said this is a profound statement because it says that, when talking about energy, all things that have a mass, m , also vibrate at a (natural) frequency, f .

So now, if we go a step further, we realize that, because all things that have a mass also have a frequency at which they vibrate, we, human beings, because we have mass, and also all other physical objects around us in our environment, because they, too, have mass, are all just bundles of vibrating energy fields.

By turning to science to better understand the reality in which we find ourselves, we have somehow gotten ourselves to draw a (seemingly) nonsensical conclusion that: we are all bundles of energy in an environment that is also filled with other bundles of energy, which we perceive as real objects, and reality itself.

What an alarming thought, isn't it?

And this is why some people are trying to argue that we probably live in some kind of "simulation," or "matrix," much like in the 1999 movie called "The Matrix," while others are saying, instead, that we are (probably) experiencing one reality in a realm of multiple, parallel realities. And there are also other sci-fi ideas like this circulating around, but, since we'd go off track in listing them, it's suffices to say, at the end of the day, these are all just attempts to help us make sense of the "damage" ideas grown out of QM has done to our collective minds.

So, where do we go from here? Do we, like in the movie, The Matrix, take the red pill to wake up to reality, or take the blue pill, to continue on, shutting our eyes and ears to truths we don't want to hear?

Well, since the title of our discussion is $E = \text{Islam}^2$, and since we know that our Holy Quran contains life-changing truths, for us that means we will take the red pill (BTW: spoiler alert, if you haven't yet seen The Matrix movie!).

And so, in our attempt to show that there is no scientific reason to doubt anything that our Holy Quran says, including the miracles that it describes, and, therefore, that there is no reason to doubt miracles can happen, we can incorporate the equation that proves wave-particle duality, $mc^2=hf$, into our discussion as follows, by saying that:

If it is true, as some interpretations of QM say, that there is relationship between a (physical) object's mass, and the frequency at which that mass vibrates, ie. as shown by the equation $mc^2=hf$, and if the h does, in fact, correctly show reality has a type of pixilation to it, and also if it all correctly works its way into the notion of different fields of energy bound together to produce reality as we know it (NB: that sure is a lot of if's!), then we can say the following about miracles the Holy Quran mentions, starting with Moses ﷺ's stick that turned into a snake:

- If an object with a certain mass, m , like Moses ﷺ's walking stick or staff, has a particular frequency/fields of energy bound together, f , at which it vibrates, while in it's stick/wooden form...
- And then that frequency (ie. of the wooden form) is modified to the frequency, for example, that a live snake would have...
- Then, that walking stick or staff should morph from being an inanimate stick, and turn into an actual living snake!

And here, through our simple QM thought experiment, we can see, from a scientific basis-in spite of all the if's we may have incorporated into our discussion-a truth in what Allah ﷻ has said in the Holy Quran about the miracle He ﷻ provided to Prophet Moses ع (Ch. 28:31):

[Allah ﷻ said to Moses ع] Throw down your staff.” And when he saw it wiggling, as if it were possessed, he turned his back to flee, and did not look back. [Allah ﷻ said] “O Moses, come forward, and do not fear, you are perfectly safe.”

And (7:103-122):

103. Then, after them, We sent Moses with Our miracles to Pharaoh and his establishment, but they denounced them. So consider the end of the evildoers.

104. Moses said, “O Pharaoh, I am a messenger from the Lord of the Worlds.”

105. “It is only proper that I should not say about God anything other than the truth. I have come to you with clear evidence from your Lord, so let the Children of Israel go with me.”

106. He said, “If you brought a miracle, then present it, if you are truthful.”

107. So he threw his staff, and it was an apparent serpent.

108. And He pulled out his hand, and it was white to the onlookers.

109. The notables among Pharaoh’s people said, “This is really a skilled magician.”

110. “He wants to evict you from your land, so what do you recommend?”

111. They said, “Put him off, and his brother, and send heralds to the cities.”

112. “And let them bring you every skillful magician.”

113. The magicians came to Pharaoh, and said, “Surely there is a reward for us, if we are the victors.”

114. He said, “Yes, and you will be among my favourites.”

115. They said, “O Moses! Either you throw, or we are the ones to throw.”

116. He said, “You throw!” And when they threw, they beguiled the eyes of the people, and intimidated them, and produced a mighty magic.

117. And We inspired Moses: “Throw your staff.” And at once, it swallowed what they were faking.

118. So the truth came to pass, and what they were producing came to nothing.

119. There they were defeated, and utterly reduced.

120. And the magicians fell to their knees.

121. They said, “We have believed in the Lord of the Worlds.”

122. “The Lord of Moses and Aaron.”

Wow! How about that? Subhanallah!

With all this in mind, we can also take a look at clearly what is one of Allah ﷻ’s pet peeves: people questioning the fact they will be resurrected after they have died, and their bones have turned to dust. There are numerous verses throughout the Holy Quran which mention both the objection people have to this notion, as well as the (very) stern retort(s) Allah ﷻ has for such people, in each and every such instance.

For us, in light of our discussion, we can see those people’s fallacy from the notion we now have of $mc^2=hf$, as well as that of different fields of energy “bunching up” to form physical matter. And, with this mind, we can see, and agree with Allah ﷻ when He ﷻ says:

It is He Who brings out the living from the dead, and brings out the dead from the living, and Who gives life to the earth after it is dead; and thus shall ye be brought out (from the dead). (30:19)

So, if our argument is on point, then our little scientific equation, $mc^2=hf$, along with all that it implies, is good enough, not only in helping us figure out the reality of our physical world, but also in helping us realize that the Holy Quran does not preach falsehood, and, thus, that Allah ع, the Sublime, the Greatest, simply (for Him ﷻ anyway!) makes the frequency/bunched up energy fields defining a living individual revert from that of ashes and dust, back to that of the living form.

And this idea can be extended to many other instances of miracles, such as: Jesus ع resurrecting the dead, and creating the bat; Abraham ع surviving having been thrown into the fire; Ismail ع having been swapped out for the sheep that was sacrificed instead; Saleh ع's camel that came out of the mountain; Zul-Qaranain ع's voyages and adventures; al-Khudur ع's long life; Moses ع's parting the sea, provisioning of enough food for all despite the meagre rations available, and his glowing hand; our Holy Prophet ص's splitting the moon in half, the tree walking towards him ص, rocks clearing out of his way, the night journey into the heavens he ص went on-while awake-on the horse called Buraaq; and numerous other such miracles.

As Shia, we also have miracles from our Aema ع, such as: the tiger in the tapestry which came out, ate an infidel, and returned back in the presence of our 8th Imam al-Reza ع; the rock that crushed the infidel who resented Amir al-Momineen ع's successorship of our Holy Prophet ص, the Amir ع resurrecting a dead man; the common stone that turned into a gold nugget when our 5th Imam ع gave to a beggar; the water droplets that turned into precious gems when our 11th Imam ع shook the excess water from ablution he had on hands into those of a believer; etc.

The point in all of this is: because science supports their soundness, there is a legitimate basis for the miracles Allah س describes in our favourite book, the Holy Quran, and, therefore, there is no scientific reason to doubt anything it says. As our discussion has tried to show, science squares off that religion is not a hoax, which is the reason we can say:
E = Islam².

Your Brother in Faith,

SMH Razvi
02-07-22; 5th Rajab

BTW: Here are some interesting videos that you may like :

- Planck's Constant and The Origin of Quantum Mechanics | Space Time | PBS Digital Studios
- Quantum Fields: The Real Building Blocks of the Universe - with David Tong
- Answer: Can a standing wave store enough energy to produce mass spontaneously?

BONUS:

There is a narration in Tafseer Qummi from our 5th Imam, Mohammed al-Baqir ع, and also our 6th Imam, Jafer as-Sadiq ع, which says the following re: 7:103-122:

When morning came, Pharaoh sent announcements out to all the cities in Egypt and gathered together a thousand magicians who had been chosen from a hundred thousand, and from a hundred chose eighty. So the magicians said to Pharaoh "You very well know there are no magicians in the world better than us, so if we overcome Moses what will be for us from you?" Pharaoh said "You will be of those who are brought nigh unto me (given high posts, ranks or honour). I shall share with you all of my kingdom." They said "But if Moses overcomes us and nullifies our magic, we will know that, for what he brings, there is no magic that can stand before it nor any excuse, and we will believe in it and recognize and accept him (ie. the truth he has brought)." Pharaoh said "If Moses overcomes you, I will also recognize and accept him along with all of you, but reach a consensus about your plans, ie. what you all will be doing (for now)."

And when the day came for the contest, Pharaoh gathered the creatures and the magicians, and had ordered a dome to be built for himself. The dome was tall the length of eighty cubits, which had been covered with iron and polished steel. Whenever the sun shone upon this dome, it was not possible for anyone to look at it because of the reflection off of the iron of the brightness of the sun. Pharaoh and Haman came up and sat upon it, overlooking everything. Moses ع came forward and looked at the sky. The magicians said to Pharaoh "We see a man who is looking at the sky, and our magic does not reach the sky, and we can ensure the magic upon the ones in the earth."

When Moses ﷺ threw down his staff, it sunk into the ground like molten lead. Then emerged its head, and opened its mouth, and placed its jaw on the top of Pharaoh's dome. It then lowered itself and it swallowed up all of the sticks and ropes of the magicians. And the defeated people, when they saw it, they magnified it, for the eyes had never seen the likes of it before, nor had any description of the describers described anything like it before. There was a stampede among the people which killed four thousand men, women, and children. And it turned to the dome of Pharaoh - and Pharaoh and Haman had wetted their clothes, and had been overwhelmed by the all the chaos that had broken out.¹

Here, we have to mention that, what was depicted in the movie The Ten Commandments (1956), ie. a stick turning into a cobra of the same length, [youtube.com/watch?v=ahkwQhQZWG8](https://www.youtube.com/watch?v=ahkwQhQZWG8), is way, way, way off, per our 5th and 6th Imam ﷺ's explanation.

In fact, per our North American popular culture, the size of the snake which Moses ﷺ's staff turned into, per our Imams ﷺ's description, seems to have been as imposing as we would consider to be a Shai-Hulud (from the movie Dune (1984); [youtube.com/watch?v=y1g4Z_nZQms](https://www.youtube.com/watch?v=y1g4Z_nZQms)), Subhanallahi wal Hamdolillahi wa laaIlahaillaho wa-Allahoakbar! (with and eternal YIEKS on top, eh?!)

¹https://hubeali.com/books/English-Books/TafseerHub-e-Ali/CH7_SuraAlAraaf_Verses103-159.pdf#page2 p. 6-8